

What is claimed is:

1. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by spraying a chemical solution onto leaves of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without being sprayed with the chemical solution.
2. The method of claim 1, wherein the chemical solution contains at least abscisic acid or analog thereof.
3. The method of claim 1, wherein the chemical solution contains at least salicylic acid or analog thereof.
4. The method of claim 1, wherein the chemical solution contains at least jasmonic acid.
5. The method of claim 1, wherein the chemical solution contains at least methyl viologen (MV) or analog thereof.
6. The method of claim 1, wherein the chemical solution contains hydrogen peroxide, sodium chloride or sulfur dioxide.
7. The method of claim 1, wherein the chemical solution contains a herbicide, a plant activator, plant growth hormone and/or stress inducing agent.
8. The method of claim 7, wherein the herbicide, activator and/or growth hormone has an elevated concentration in the chemical solution compared to conventional tobacco plant treating solutions of the same ingredients.

9. The method of claim 1, wherein the chemical solution effects reduction in available carbon dioxide used in photosynthesis.

10. The method of claim 1, further comprising preparing cured tobacco by harvesting the tobacco plants and subjecting at least some of the tobacco leaves of the tobacco plants to a curing process, the level of antioxidants in the tobacco leaves being sufficient to reduce nitrosation during the yellowing and browning phases of the curing process.

11. The method of claim 1, wherein the chemical solution contains at least one chemical compound which can affect chloroplast activity, the chemical compound being sprayed onto the tobacco leaves in an amount sufficient to stimulate formation of reactive oxygen species in the tobacco leaves.

12. The method of claim 1, wherein the chemical solution is sprayed onto the tobacco plants at different times prior to harvest.

13. The method of claim 1, wherein the tobacco is burley tobacco, the method further comprising air curing the burley tobacco after harvesting the tobacco plants.

14. The method of claim 1, further comprising subjecting the growing tobacco plant to mechanical stress sufficient to raise the level of antioxidants in the tobacco leaves.

15. The method of claim 1, wherein the tobacco plants are sprayed only once with the chemical solution at least about one week prior to harvesting of the tobacco plants.

16. The method of claim 1, wherein the tobacco plants are sprayed with the chemical solution between topping to remove the flowers from the tobacco plants and harvesting of the tobacco plants.

17. The method of claim 1, further comprising root pruning or xylem cutting of the tobacco plants.

18. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by spraying a chemical solution onto leaves of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without being sprayed with the chemical solution, the chemical solution comprising an aqueous solution which effects reduction in available carbon dioxide used in photosynthesis.

19. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by spraying a chemical solution onto leaves of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without being sprayed with the chemical solution, the chemical solution comprising at least one chemical compound selected from abscisic acid, salicylic acid, harpin, methyl viologen, acifluorfen, acifluorfen sodium, jasmonic acid, hydrogen peroxide, sodium chloride, and sulfur dioxide, the chemical compound being sprayed onto the tobacco leaves in an amount sufficient to stimulate formation of reactive oxygen species in the tobacco leaves.

20. A cigarette comprising the cured tobacco of claim 10.

21. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by a soil treatment wherein a chemical solution is applied to the soil surrounding the roots of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without the soil treatment.

22. The method of claim 21, wherein the chemical solution contains at least abscisic acid or analog thereof.

23. The method of claim 21, wherein the chemical solution contains at least salicylic acid or analog thereof.

24. The method of claim 21, wherein the chemical solution contains at least jasmonic acid.

25. The method of claim 21, wherein the chemical solution contains at least methyl viologen (MV) or analog thereof.

26. The method of claim 21, wherein the chemical solution contains hydrogen peroxide, sodium chloride or sulfur dioxide.

27. The method of claim 21, wherein the chemical solution contains a herbicide, a plant activator, plant growth hormone and/or stress inducing agent.

28. The method of claim 27, wherein the herbicide, activator or growth hormone has an elevated concentration in the chemical solution compared to conventional tobacco plant treating solutions of the same ingredients.

29. The method of claim 21, wherein the chemical solution effects reduction in available carbon dioxide used in photosynthesis.

30. The method of claim 21, further comprising preparing cured tobacco by harvesting the tobacco plants and subjecting at least some of the tobacco leaves of the tobacco plants to a curing process, the level of antioxidants in the tobacco leaves being

sufficient to reduce nitrosation during the yellowing and browning phases of the curing process.

31. The method of claim 21, wherein the chemical solution contains at least one chemical compound which can affect chloroplast activity, the chemical compound being applied to the soil in an amount sufficient to stimulate formation of reactive oxygen species in the tobacco leaves.

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32. The method of claim 21, wherein the chemical solution is applied to the soil at different times prior to harvest.

33. The method of claim 21, wherein the tobacco is burley tobacco, the method further comprising air curing the burley tobacco after harvesting the tobacco plants.

34. The method of claim 21, further comprising subjecting the growing tobacco plant to mechanical stress sufficient to raise the level of antioxidants in the tobacco leaves.

35. The method of claim 21, wherein the soil is treated only once with the chemical solution at least about one week prior to harvesting of the tobacco plants.

36. The method of claim 21, wherein the soil is treated with the chemical solution between topping to remove the flowers from the tobacco plants and harvesting of the tobacco plants.

37. The method of claim 21, further comprising root pruning or xylem cutting of the tobacco plants.

38. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by a soil treatment wherein a

chemical solution is applied to the soil surrounding roots of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without the soil treatment, the chemical solution comprising an aqueous solution which effects reduction in available carbon dioxide used in photosynthesis.

39. A method of reducing tobacco-specific nitrosamines in cured tobacco, comprising raising the levels of antioxidants in tobacco leaves by a soil treatment wherein a chemical solution is applied to the soil surrounding the roots of a growing tobacco plant at least one time prior to harvesting, the antioxidants being raised at least 25% compared to harvested tobacco plants grown without the soil treatment, the chemical solution comprising at least one chemical compound selected from abscisic acid, salicylic acid, acifluorfen, acifluorfen sodium, harpin, methyl viologen, jasmonic acid, hydrogen peroxide, sodium chloride, and sulfur dioxide, the chemical compound being applied to the soil in an amount sufficient to stimulate formation of reactive oxygen species in the tobacco leaves.

40. A cigarette comprising the cured tobacco of claim 30.

41. The method of claim 4, wherein the chemical solution further comprises salicylic acid or an analog thereof.

42. The method of claim 4, wherein the chemical solution further comprises abscisic acid, methyl viologen or an analog of methyl viologen, hydrogen peroxide, sodium chloride or sulfur dioxide.

43. The method of claim 4, wherein the chemical solution further comprises a herbicide, a plant growth hormone, or a stress inducing agent.

44. The method of claim 4, wherein the chemical solution further comprises a herbicide, a plant growth hormone or a stress inducing agent.

45. The method of claim 44, wherein the chemical solution further comprises a second plant activator.

46. The method of claim 4, wherein the chemical solution further comprises a second plant activator.

47. The method of claim 1 further comprising pruning roots or cutting xylem of the tobacco plant.

48. The method of claim 4, further comprising pruning roots or cutting xylem of the tobacco plant.

49. The method of claim 1, wherein the chemical solution contains at least harpin or an analog thereof.

50. The method of claim 21, wherein the chemical solution contains at least harpin or an analog thereof.

51. The method of claim 1, wherein the chemical solution contains at least acifluorfen or acifluorfen sodium.

52. The method of claim 21, wherein the chemical solution contains at least acifluorfen or acifluorfen sodium.